

REMARKS

Non-elected claims canceled

Applicant here cancels withdrawn non-elected claims 5 to 8 without prejudice to their re-assertion in a divisional or continuation application.

Double patenting rejection

The Examiner has rejected all claims under a provisional double-patenting theory over U.S. patent application 10/555,853.

Upon allowance of this application, applicant will submit terminal disclaimers by each owner of the present application for any part of the term of the present application that would extend beyond the end of the term of any patent that may issue on 10/555,853. It is believed that such terminal disclaimers should obviate the double-patenting rejection.

Information Disclosure Statement

In view of the alleged similarity of the claims in application 10/555,853 to the claims in this application, applicant submits herewith an Information Disclosure Statement listing the references from that application. A check including the amount of \$180.00 is enclosed for the fee for submission of the disclaimer. If the check is insufficient or not found, please deduct any fee for the entry of the disclaimer from deposit account 501659.

Entry of these references on the record of this application is respectfully requested.

Prior art rejections

The Examiner has rejected all pending claims 1 to 4 as obvious based on the argued combination of U.S. patent 6458131 to Fabian with U.S. patent 6306489 to Hellmann, or the argued combination of U.S. patent 5306473 to Nakajima with U.S. patent 5174801 to Matsumura.

Reconsideration of these rejections is respectfully requested.

Claim 1 has been amended for purely syntactical reasons to provide proper antecedent basis for all terms, and also to express the claim language in better English. No change in scope of the claim is believed to have been incurred by this amendment.

Claim 1 as mended recites a quartz glass crucible for pulling up single crystal silicon. The crucible comprises a crucible base body having a bottom part having a lowest side and a side wall having an upper end plane, and an inner layer provided on an inner surface. The inner layer comprises a first part made of a synthetic quartz extending from the bottom part to a height of at least 0.25 H, a second part made of a naturally occurring quartz glass or made of mixed quartz glass of naturally occurring and synthetic quartz glass, and extending in at least a range of from 0.5 H to 0.8 H, and a residual part made of quartz glass selected from the group consisting of synthetic quartz glass, naturally occurring quartz, and mixed quartz glass of naturally occurring and synthetic quartz glass. H represents a height from the lowest side of the bottom part to the upper end plane of the wall.

The claimed crucible provides for reduced vibration in the surface of a melt when the crucible is used in a drawing process. See specification, page 4, line 6 to 9. The claimed

crucible is not suggested by the cited prior art.

Fabian shows a crucible having an inner layer 15 that is completely of synthetic quartz glass. Col. 5, lines 23 to 26. A small portion of the inner layer 15 is covered with a roughened synthetic quartz layer 50. Col. 7, lines 52 to 54. Although other portions of the crucible are of natural quartz, (see col. 5, lines 15 to 19), nowhere does Fabian suggest using naturally occurring quartz in the inner layer 15.

Hellmann shows a reactor chamber for plasma etching of semiconductors. The chamber has an inner layer, part of which is a high micro bubble layer (5, 11) a rough layer of quartz sand (see col. 8 lines 3 to 11) i.e., naturally occurring quartz glass. Another part of the inner layer is a TH layer 13 of high purity synthetic quartz glass. Col. 7, lines 45 to 48.

The chamber is exposed to plasma, not to melt, and the purpose for the roughened dome roof is so that material is deposited onto it and held there, avoiding contamination. The TH layer 13, on the other hand, is in an area where material will be removed, but synthetic quartz glass is used in this location to avoid contamination from that removal. See col. 7, lines 48 to 51.

The crucible of Fabian and the reactor of Hellmann are such different applications that combination of these references as the Examiner urges is improper. The problem of melt vibration is so remote from Hellmann that one of skill in the art in the crucible field would not advert to any teaching of Hellmann.

This is more apparent when the two structures, both of which are somewhat bowel-like, are compared, although Hellmann is a dome cover, and consequently inverted. The bottom of the crucible claimed has a layer of synthetic glass, while the inverted bottom of the bowl-shape

of Hellmann is of naturally occurring quartz glass.

The Examiner contends that Hellmann gives a cost motivation that would substitute natural quartz glass for the roughened synthetic glass of the ring of Fabian. In fact, however, cost of the manufacture of the crucible is not as important issue as the main objective of the suppression of melt vibration. Furthermore, if the teaching of Hellmann is the substitution of natural glass for synthetic to cut costs, Hellmann would cause the artisan to make the entire crucible inner layer of natural glass to reduce cost, not just a portion, as recited in claim 1.

Fabian and Hellmann therefore cannot be combined to produce the claimed invention.

Nakajima teaches a crucible made from “quartz crystal powder” (col. 4, line 58), which suggests to one in the technical area a naturally occurring quartz crystal powder. A part 15 of the crucible is transparent glass, while elsewhere the surface 17 has bubbles that make it opaque. Col. 3, lines 45 to 53. The transparent portion 15 is of the same material, just rendered transparent by the use of an electric arc operation. Col. 5, lines 24 to 25.

The Examiner argues that it would have been obvious to replace the transparent natural quartz layer 15 of Nakajima with the transparent synthetic quartz layer of Matsumura. This contention is based on the premise that synthetic glass is *per se* transparent and natural quartz is not. However, the transparent layer of Nakajima is natural quartz, and synthetic glass may be opaque, as in layer 14 of Hellmann, for example. The transparency is purely a matter of the heat treatment of the glass during creation of the crucible.

Matsumura shows a crucible with an inner surface that is all synthetic quartz. Nothing in this reference or Nakajima suggests the use of a part of the inner surface of synthetic glass in Matsumura in place of the transparent natural quartz layer of Nakajima, except that both are

transparent. That, however, is not a consideration that would guide one of skill in the art. There is, in fact, no motivation in either Nakajima or Matsumura to combine the references as the Examiner has urged.

Finally, no reference suggests the dimensional ranges of the differing types of glass in the inner layer of the crucible. No reference shows a crucible with a synthetic layer up to at least 0.25H and a naturally occurring quartz layer over at least the range of 0.5 to 0.8H.

The cited art therefore fails to suggest all the elements of the article claimed, and reconsideration of the rejection is respectfully requested.

Claims 2, 3 and 4 depend from claim 1 and therefore distinguish therewith over the prior art.

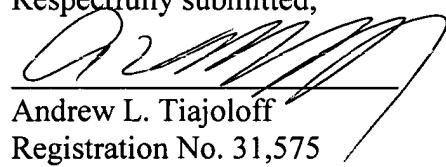
All claims having been shown to distinguish over the prior art in structure, function and result, formal allowance is respectfully requested.

Should any questions arise, the Patent Office is invited to telephone attorney for applicants at 212-490-3285.

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Respectfully submitted,


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